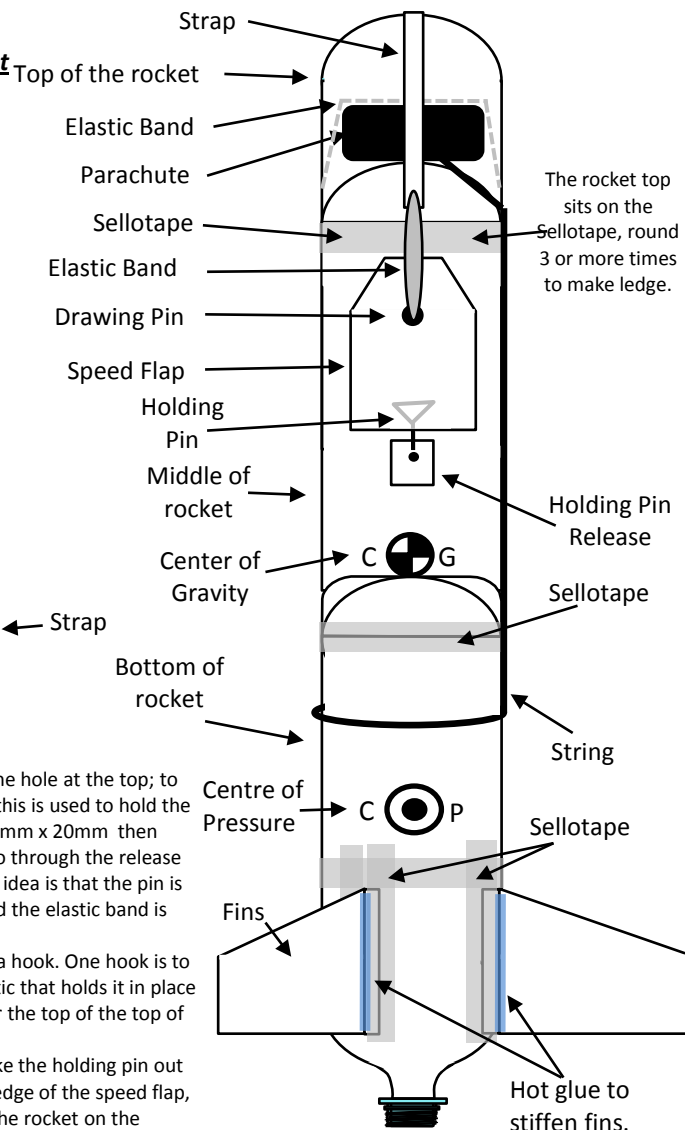
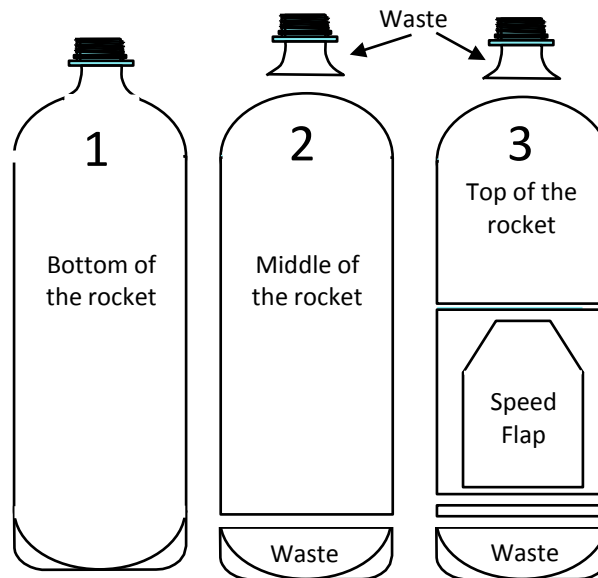
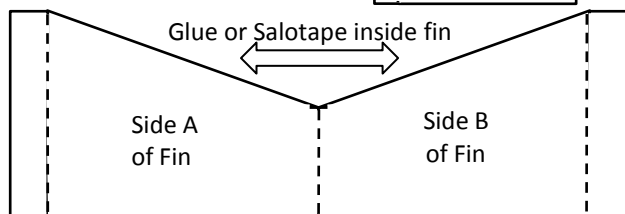
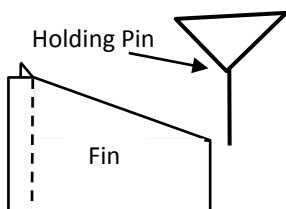


Building a Rocket (Advanced)

Before you build a rocket try the bottle on the launcher to test if it holds pressure and fits correctly.

You Will Need	Tools
3X 2ltr Bottles	1X Hot Glue Gun
1X Paper Clip	1X Pair of Scissors
1X Glue/Double Sided Tape	1X Fine Marker Pen
1X Cardboard	1X Pliers
1X Bin Liner	
1X Roll of Sellotape	
Fishing Line or Thin String	
Elastic Bands	
Sheets of Paper	
Drawing Pin	



The 1st bottle is kept the same, just remove any bits of plastic from the top, which are the same colour as the screw cap.

The 2nd bottle is cut in to three pieces, remove the top and the base of the bottle to help reduce weight of the rocket.

The 3rd bottle needs the top and bottom removed like bottle two. Then use sellotape and stick the tape across the gap to cover the hole at the top; to make it more of a point put crunched-up paper or plastic form a carrier bag on the nose and tape over to hold on the top. Then cut out the speed flap, this is used to hold the strap down and then release the parachute at the right time. Make the holding pin release by cutting out a rectangle out of the plastic bottle, about 15mm x 20mm then make a hole in the centre bottom edge about 3mm in from the edge. Tape the release to the rocket, just below the speed flap, the holding pin should go through the release hole when the release is lifted. It should hinge at the edge with the small hole, make sure the release folds down easily down the side of the rocket. The idea is that the pin is held in place until you fire your rocket, at this point the release folds down and the flap is held down with the air flow until the rocket stops going up and the elastic band is released popping the top of the rocket and allowing the parachute to open!

The strap is made out of a ring of plastic from the bottle then cut to make it one long length, then bent over at each end to make a hook. One hook is to hold on to the body of the rocket and the other has the elastic band hooked over it. After putting the elastic band on the end of the strap, tape the plastic that holds it in place so that it doesn't come off. The other end of the strap is stuck or put through cut s on the body of the rocket then taped in to place. The strap goes over the top of the top of the rocket, it is held down by the elastic band which hooks onto the drawing pin.

The speed flap needs the drawing pin pushed through at about the middle and taped over to hold it in place. You will need to make the holding pin out of the paper clip, Make it about 20mm long with a triangle shape at the end to help it stay fixed to the flap edge. Make two small holes on the bottom edge of the speed flap, one on top of the other about 10mm apart for the holding pin to be weaved through and tape on the back to hold it in place. The speed flap is fixed to the rocket on the opposite side to the strap fixing point, tape it about the width of the sellotape down from where the top of the rocket meets the middle of the rocket.

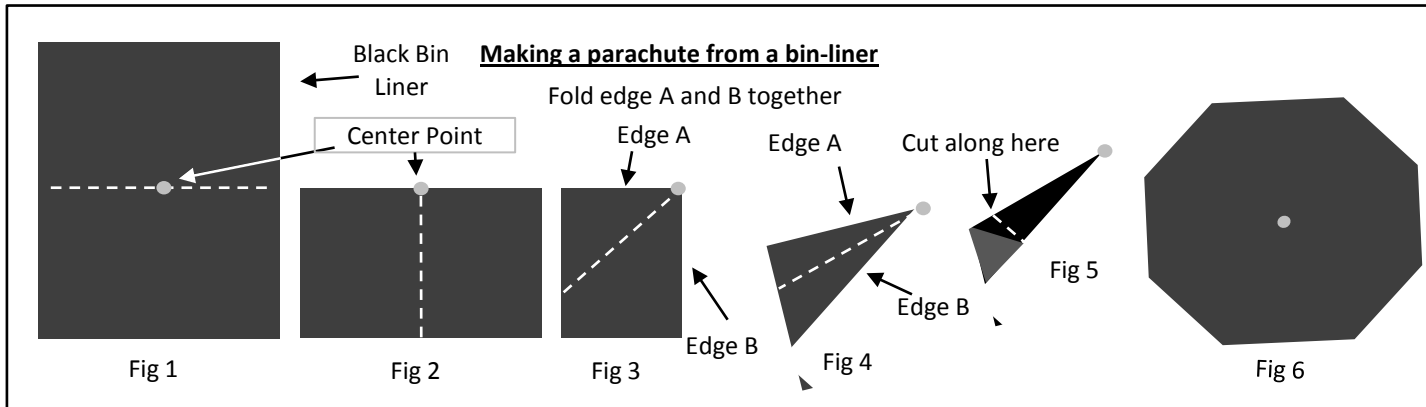
The fins are made out of cardboard from a cereal packet. The fin is in two parts that are stuck or double sided sticky taped together. The two tabs are bent out along the dotted line after scoring with the back of a knife, these are used to tape the fin to the rocket. To make the fin water-proof use package tape and fold over the edges and use on both sides. The fins are then hot glue gunned in the corners of the tab and fin on each side, this gives the fin more support. Finally the fins are taped to the rocket using sellotape on each tab and then around the rocket to stop the tape peeling off. They should be arranged symmetrically around the rocket (every 120° if you have three fins or every 90° if you have four). Use a sheet of paper to help mark the correct location for the fins. (fig 6) Wrap the paper around the rocket base and make where the paper overlaps (Fig 6), then divide the paper (Fig 7) into three (or four if making four fins for your rocket). Put the paper back round the base of the rocket and mark where the fins are to go. Take the paper off the rocket and put the marks up against a door frame (Fig 8) so that you get a straight line along the bottle (you don't want fins going in the wrong direction). Then put the fins where you have marked the base of the rocket..

Building a Rocket Continued ...

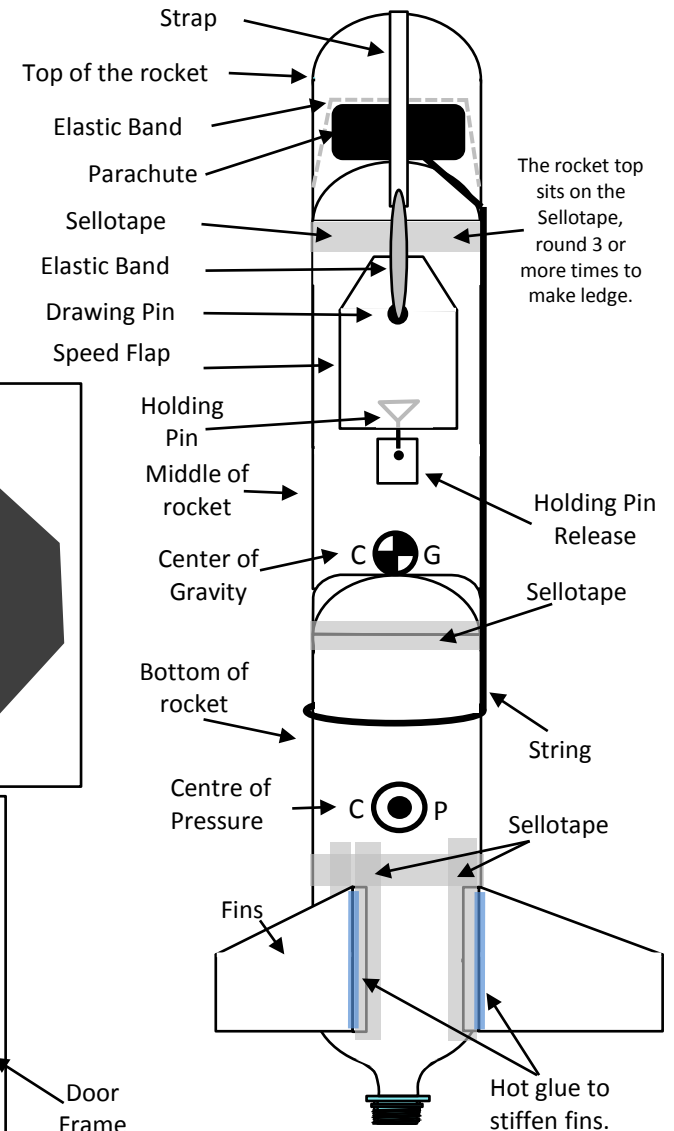
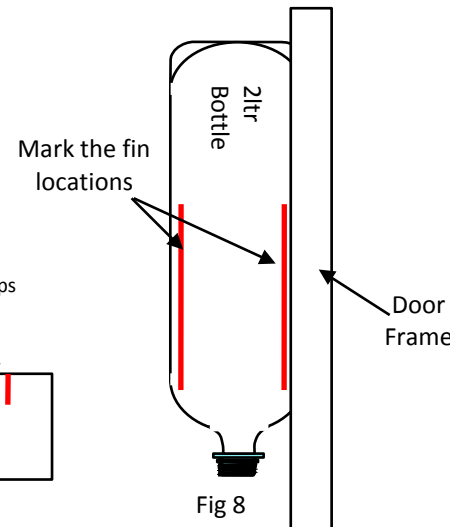
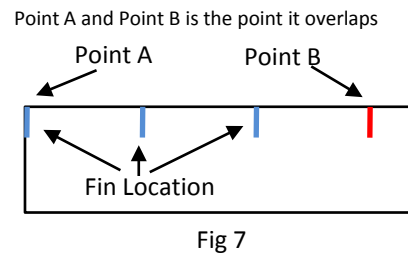
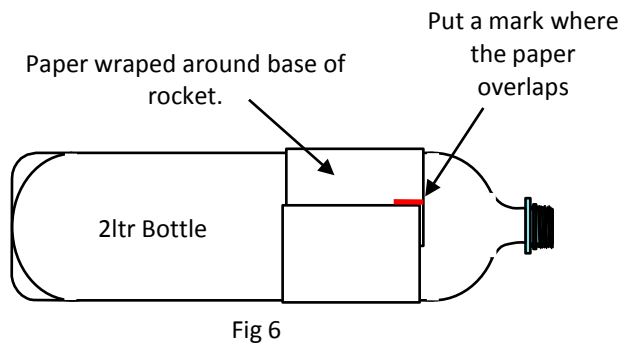
The parachute is made out of a bin liner (any colour will do). Fold the bin liner in half (Fig 1) then in half the other way (Fig 2), then fold the two edges A and B together (Fig 3), and then fold the two edges A and B together again (Fig 4). Cut from one corner to the opposite side (Fig 5), now open out and you should have a two circles (Fig 6). Using the fishing line make four lengths of about 150cm. Holding all four lengths, bring the ends together and tie a knot in the middle (where the line bends back) making a loop about 2cm from the end. This is used to tie it to the rocket. Sellotape the ends of each line to the circle made out of the bin liner (all eight ends) first tape the ends in from the edge of the circle then bend it back over the tape and tape again to lock the line in position.

The top of the rocket needs a elastic band across the bottom of it so that it pushes itself off the top when it is released by the strap. Make a hole about 1cm from the base of the top, and another on the opposite side, put the ends of the elastic band through the hole and put a small stick (match stick) through the loop of the elastic band as it pops through, tape to stop it moving.

Almost finished!!!! Now get some string and tie it around the rocket about a third of the way from the bottom of the rocket, then tie the parachute to the string. The parachute fish line loop should be connected where the string goes over the of the middle rocket section, then a short length of string to the elastic band attached to the rocket top.

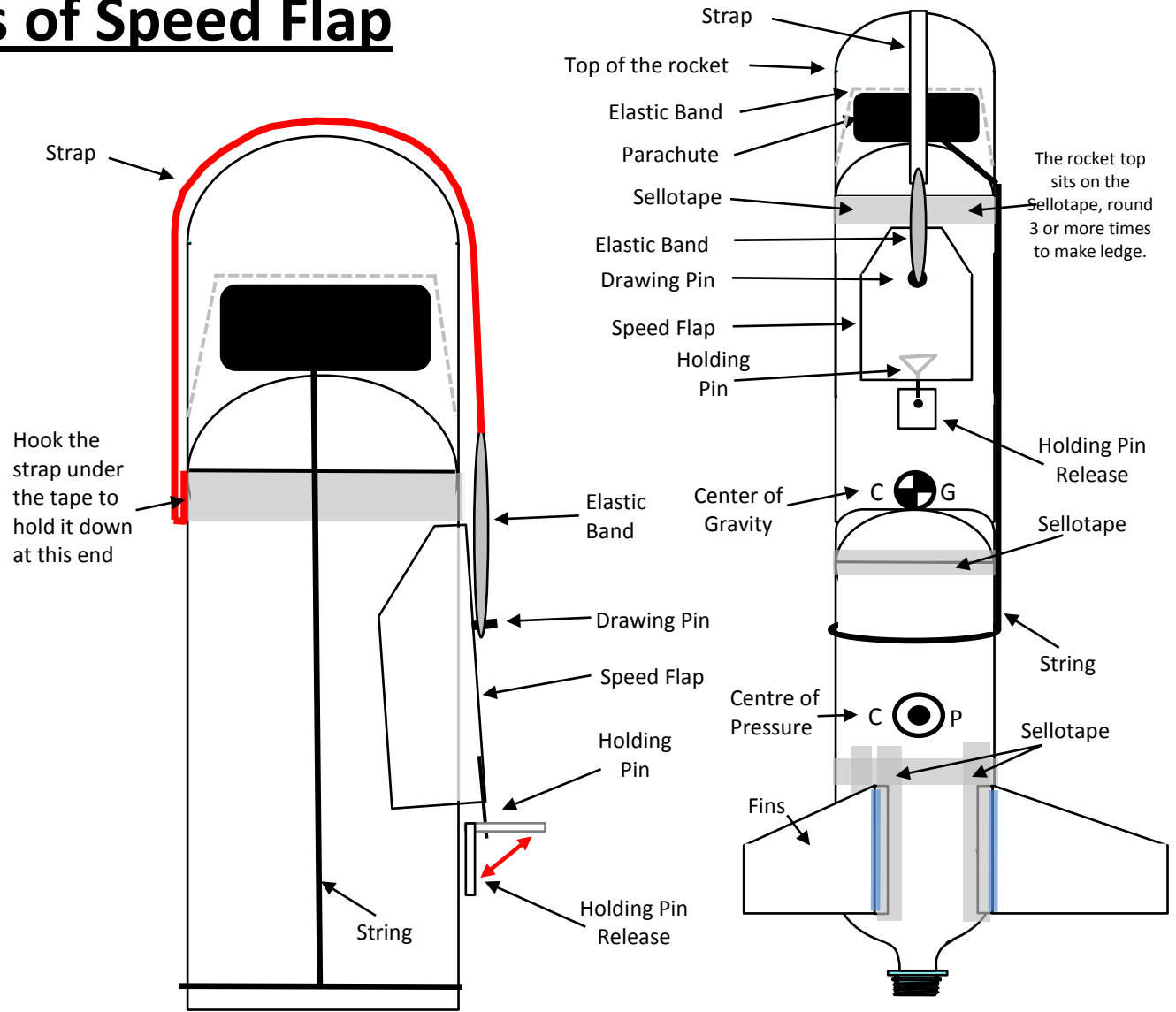
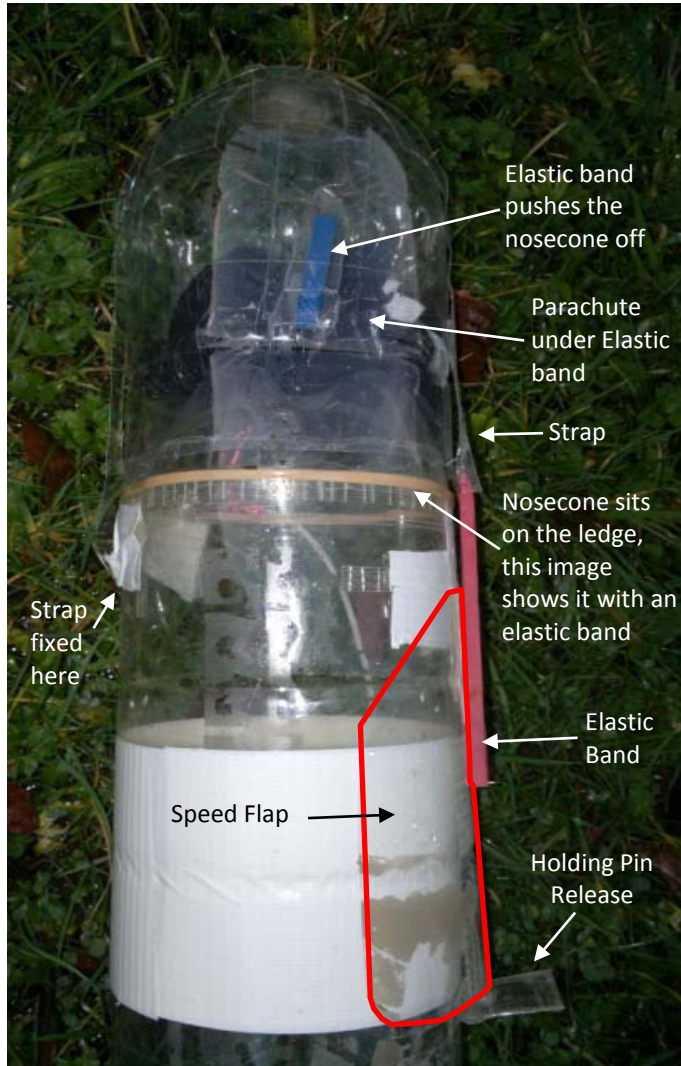


Marking the Fin Locations on a 2ltr Bottle



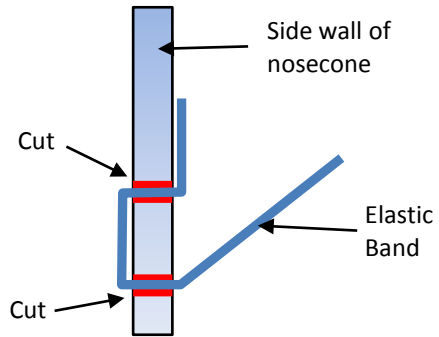
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Drawings & Images of Speed Flap

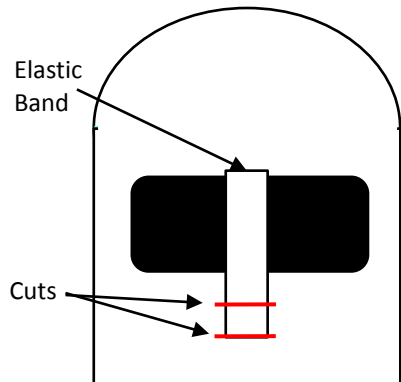


Side View of flap Release

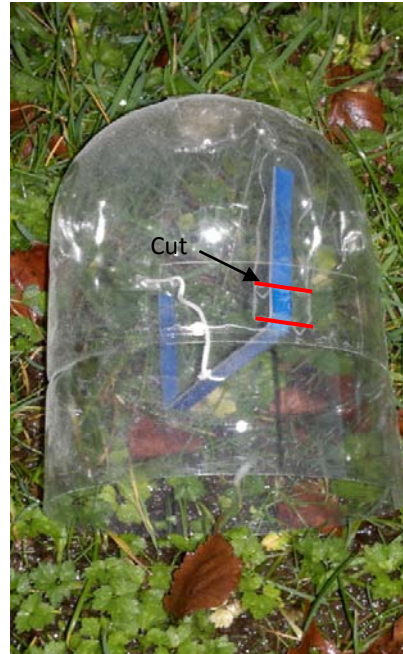
Cut the elastic band and feed it through the side wall of nosecone then tape down on the inside and outside, do not stretch to much.



Enlarged View of elastic band through cuts in the nosecone



Nosecone



Images of nosecone



Images of the speed flap, nosecone & strap

Images are from a water rocket that is well used and has seen alot of launches so is a little rough around the edges!



Images of the speed flap, nosecone & strap

Images are from a water rocket that is well used and has seen alot of launches so is a little rough around the edges!



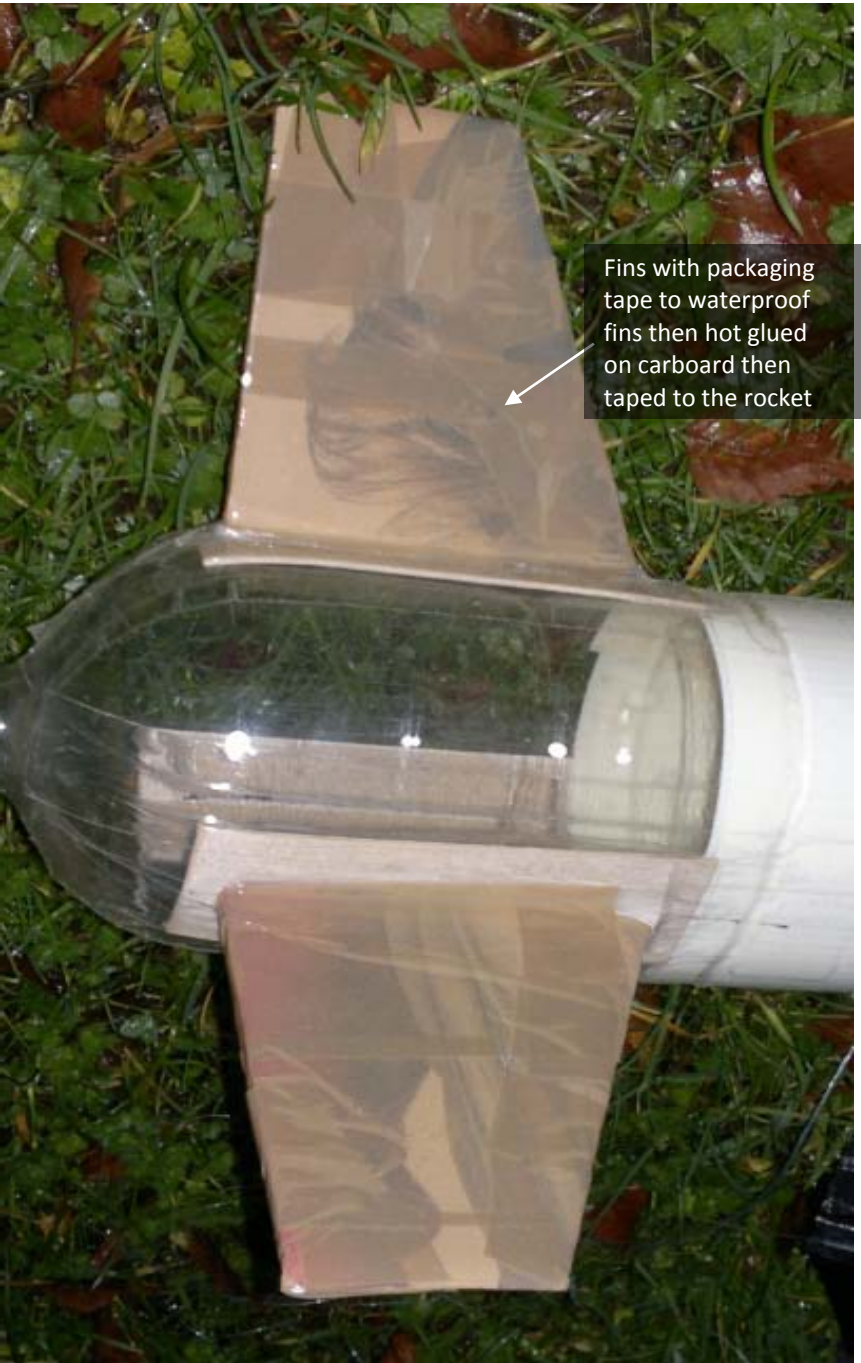


Image of fins on the base of the rocket

Images are from a water rocket that is well used and has seen alot of launches so is a little rough around the

Image of speed flap and parachute

